# Translations from Arabic (Astronomy/Astrology): The Formation of Terminology

In the history of science the notion of "Arabic science" – or, in our context, "Arabic astronomy" – is a well-known term, mostly in connection with its influence on the development of Western science in the Middle Ages. This term, however, needs some comment, both for the terms "astronomy" and "Arabic".

First: the Arabs were the inhabitants of the Arabian Peninsula, mostly bedouins, largely isolated from the scientific developments in the Near Eastern regions cultivating the sciences. On the other hand, these Arabs observed the natural phenomena for many centuries. They observed the stars and their behaviour through the year and derived from them rules for fixing the seasons and periods of rain and drought etc. and used the stars for orientation in their migrations by night. All this was sort of a popular knowledge of the sky and popular star lore. After the spread of Islam through the countries of the Middle East the Arabs gradually became acquainted with the sciences cultivated in the Byzantine and Iranian regions. In the eighth century translations of astrological and astronomical works began to be made from Persian, Indian and Greek into Arabic, and from now on started what has become so well-known as "Arabic astronomy", i.e. the "scientific" astronomy, in contrast to the old-Arabic folk astronomy. While the translation movement continued into the tenth century, from the first half of the ninth century on "Arabic" astronomers, having studied the translated materials, began to develop their own, "Arabic", scientific, and no longer popular, astronomy.

Second: the scholars active in this scientific development were no longer "Arabs" in the strict sense of the word. The new movement was shared and promoted by members of the various populations of the Islamic area, from Iran, Turkestan, etc. The language, however, in which these scholars wrote was Arabic, for about five centuries. Then, gradually, also Persian became involved and, still later, since the sixteenth century, also Turkish. So what we generally call "Arabic astronomy" was a science cultivated by individuals from all the peoples belonging to the entire Islamic area, in the East and in the Muslim West, the Maghreb and al-Andalus. It is therefore now often more appropriately called Arabic-Islamic astronomy.

Third: nearly all of the Latin translations from Arabic which are of interest here were made in Spain, from the late tenth to the thirteenth centuries. This

means that the texts translated could only comprise Eastern Arabic texts composed up to the middle of the eleventh century wich reached al-Andalus in time to be considered by the Latin translators of the twelfth century, and some texts written in al-Andalus up to the end of the eleventh century. The bulk of Arabic-Islamic astronomy developed and written after that time remained unnoticed in Europe until the seventeenth century when orientalists began to study and edit oriental texts.

Fourth: it should be noted that in Antiquity and the Middle Ages there was no distinct separation between what we now call astronomy and astrology. Often astronomers also treated themes of astrology (cf., e.g., Ptolemy's *Tetrabiblos*). The parameters procured by astronomy were always at the base of astrological calculations. The strict separation of astrology from astronomy came only in early modern times [1].

When we now turn to our main subject – the contribution of the Arabic-Latin translators to the formation of Western astronomical terminology – we are confronted with a number of other problems.

The Arabic texts translated into Latin were partly Greek works in Arabic translation (as, e.g., Ptolemy's *Almagest*) and partly original works of Arabic-Islamic authors written on the basis or against the background of translated Greek materials. For an appropriate evaluation of the Latin translators' terminology one has therefore equally well to analyse both the underlying Arabic terminology and its model, the Greek terminology. Here also Syriac and Persian must be considered. Several Greek texts were first translated into Syriac and then further into Arabic, or a translator working directly from Greek into Arabic had a strong Syriac background so that his style was more or less influenced by Syriac (it should be noted that most of the Greek-Arabic translators were non-Muslims belonging to the Christian-Syriac milieu). Other Greek texts, especially in astrology, reached the Arabs via Iran, in Persian versions; their Arabic translations, in the eighth century, seem to predate the direct translations from Greek. In addition to all that it must be established what had existed and survived into the Middle Ages of an older Latin, Roman, astronomical terminology. Only against this background it can be ascertained how far the translators continued to use a traditional Latin vocabulary and which innovations they brought in. And last but not least one has to consider the erudition and abilities of the Latin translators themselves. All the Arabic-Latin translations in Spain were made in the reconquered Christian parts of Spain, where the Muslim element – language and materials – had been more or less completely extinguished after the Christian reconquest. The question therefore is how, and how much, could the translators, several of whom came from various parts of Europe outside Spain, acquire of the Arabic language so as to be able to translate the highly technical matter from Arabic manuscripts which usually would have been written in the Andalusian Maghrebi script. For some of the so-called "translators" it has been reported that they enjoyed the help of a native speaker

[1] HÜBNER 1990.

of Arabic, such as Gerard of Cremona who – according to Daniel of Morley – was aided by a Mozarab named Galippus (Ghālib) in translating Ptolemy's *Almagest*[2]. In one case, the translation of Avicenna's *Liber de anima*, the method of translation has been described in detail: a Jewish helper, Johannes Auendehut, translated the text word by word into the old-Spanish idiom of the time, and the "translator", Dominicus Gundisalvi, converted that into Latin and wrote it down[3].

Next, we should look for some tools which may be of help for ascertaining the astronomical and astrological terminology in the various stages of transmission of the subject. The Greek astronomical terminology has not been assembled in a special study; here, the detailed study of Neugebauer 1975 may be of some help. For Greek astrology, Bouché-Leclercq 1899 is still a valuable source. In Arabic, for astronomy there may be mentioned Nallino's commented edition of al-Battānī's *al-Zīj al-ṣābi'* with a valuable "Glossarium" which often includes the underlying Greek terms (Nallino's work has been written in his own, modern, Latin[4]). For both astronomy and astrology al-Bīrūnī's *Kitāb al-tafhīm* can here be cited. The Arabic text, accompanied by an English translation, contains the definitions of a great many astronomical and astrological terms[5]. The classical Latin terminology has been assembled and described by Le Bœuffle 1987. For the medieval terminology the situation is different and will be discussed soon.

While the Greek and the old Latin texts have mostly been edited in critical editions, this is not the case with the Arabic texts and the medieval Latin translations. Only some of them exist in modern editions so that a comprehensive survey of their terminologies is not yet possible.

In addition it must be kept in mind that both in the Greek-Arabic and the Arabic-Latin translation movements numerous translators were at work. In several cases also both in Arabic and in Latin the same text was successively translated more than once. So the *Almagest* was translated into Arabic at least three times, the last of these translations was again "revised" soon after its production. In Latin, e.g., al-Farghānī's *Astronomy* or Abū Maᶜshar's *Introductorium maius* were translated twice, by different translators, within one or two decades. All this together with other reasons led to the effect that in the translations, both Arabic (from Greek) and Latin (from Arabic), we find a great variety in the terminology.

Further, with the Latin translators from Arabic we find various methods of translating. On the one hand Gerard of Cremona followed the Arabic almost word by word, also in the syntax, so that his texts rather appear as a sort of Arabic in Latin words than a genuine Latin text. If a text ascribed to Gerard runs in a more fluid Latin, like his translation of Euclid's *Elements*, one feels

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[2] MAURACH 1979, § 192-195.
[3] BARDENHEWER 1882, pp. 123f.
[4] Al-Battānī 1899-1907; the Glossarium is in vol. ii, pp. 319-358.
[5] WRIGHT 1934.

compelled to assume that this is the result of a later reworking and "polishing" by others. Very close to the Arabic are also the translations of John of Seville. On the other hand, Hugo of Santalla or Hermann of Carinthia handle the Arabic texts very freely so that it is sometimes even difficult to recognize behind their words the Arabic original. Also under this aspect no unified, standardized, terminology can be expected.

As already said, only few translated astronomical and astrological texts, Arabic as well as Latin, have so far been edited. Apart from Nallino's monumental edition of al-Battānī's *Opus astronomicum,* which has already been mentioned, one should here cite Lemay's recent edition of Abū Maᶜshar's *Introductorium maius,* in Arabic and in the two Latin translations by John of Seville and Hermann of Carinthia, the edition of Abū Maᶜshar's *Abbreviation of the Introduction* in Arabic and in Adelard of Bath's Latin version by Burnett, Yamamoto and Yano, and the edition of Abū Maᶜshar's *De magnis coniunctionibus*, also in Arabic and Latin, by Yamamoto and Burnett. All these contain Arabic and Latin glossaries. The two surviving Arabic versions and Gerard's Latin translation of the star catalogue in Ptolemy's *Almagest* have been edited by Kunitzsch; the nomenclature of the 48 constellations and the terminology in the designations of the individual stars have been published and discussed, giving the Greek, the Arabic and the Latin evidence, also by Kunitzsch[6].

In view of this state of publication and research one must admit that it is still by far too early to proceed to definite judgments on the contribution of the translators to the formation of a Latin astronomical and astrological terminology in the Middle Ages. In the present state of knowledge it seems that the formation of a standardized Latin astronomical and astrological terminology began in the generation of scholars following the period of the translations. Here scholars like John of Sacrobosco or Jordanus de Nemore and compilators like Leopold of Austria and others paved the way to the formation of the terminology. It should also be mentioned that such terminology soon radiated into the vernaculars, French[7], English[8], and German[9].

In the last five decades the study of Arabic-Islamic astronomy/astrology and its medieval Latin continuation has seen a new impetus. There are now modern bibliographies of the pertaining Arabic literature[10] and of Latin translations in the field[11]. A number of texts have been edited in an ideal way, i.e. presenting both the Arabic and the Latin versions together[12], and some studies appeared treating the development of the terminology in general or discussing individual

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[6] KUNITZSCH 1974, constellations pp. 172-212, star designations pp. 217-370. Other cases of nomenclature and terminology are also discussed there on pp. 115-131, 156-164, 171, 214-217.

[7] See DÖRR 1998.

[8] Geoffrey Chaucer; cf. the edition of SKEAT 1872 and some others.

[9] Konrad von Megenberg 1980.

[10] SEZGIN 1978, 1979.

[11] CARMODY 1956 (not reliable in every detail); LORCH 2001 (concise listings of titles, authors and translators). For Gerard of Cremona, cf. also KUNITZSCH 1992.

[12] Cf. the editions mentioned above.

translators, as cspccially Gerard of Cremona [13]. Selected topics of astronomical ternminology in the translations have been published [14].

The immense influx of new terminology through the translations in a field not intimately cultivated so far in the medieval West must have caused a feeling of uncertainty and perplexity with the readers of these texts.

The translators in most cases had no traditional Latin terms at their disposal and, as already said, introduced literal renderings of the Arabic terminology. So, e. g., for the Greek ἀπόγειον and περίγειον they circumstantially wrote *longitudo longior* and *longitudo propinquior*, imitating the Arabic *al-buᶜd al-abᶜad* and *al-buᶜd al-aqrab*. Instead of giving a straightforward Latin rendering, the translators often retained the Arabic term in transliteration, sometimes – but not always – adding to it a Latin explanation. This procedure was most frequent in the oldest translations of the late tenth century, in the *Sententie astrolabii* and accompanying texts on the astrolabe, partly translated from Arabic and partly self-written with Arabic materials at hands [15]. In the twelfth century, Arabic terms were more and more suppressed in favour of pure Latin expression. The foreign terms were not always of genuine Arabic origin; especially in astrology a great many Persian terms – in Arabic spelling – were retained in the Latin translations. Some of the transliterated Arabic terms were formally Latinized giving them Latin inflexion terminations, as, e.g., *aux*, genit. *augis*, from Arabic *awj*, "apogee", which itself was derived from Sanskrit *ucca* [16], or, in astrology, *hyleg* [17], which also became *hylegium*, etc. Three of the Arabic terms borrowed into Latin in the tenth and twelfth centuries have survived into our days and are common to astronomers: the *zenith* [18], its opposite, the *nadir* [19], and the *azimuth* (the latter one wrongly understood as a singular, though originally it was an Arabic plural [20]).

The multiplicity of the terminology thus formed led to the compilation of glossaries of astronomical and astrological terms. The oldest such glossary may be the one of Fulbert of Chartres (d. 1028) who collected 28 Arabic terms from the *Sententie astrolabii* [21]. Two glossaries from the fifteenth century have been edited by Kunitzsch 1977, the one complete, containing 59 lemmata both Arabic and Latin; from the other, which is of considerable length (33 pages in the manuscript), only the 33 Arabic lemmata were selected. A shorter glossary

[13] McCarthy 1979; L'Huillier 1994; Kunitzsch 1994a, 1996.

[14] Lorch 1990 (giving the translators' terminology and the terminology of successive medieval authors for selected astronomical terms); Kunitzsch 1994b (giving a selection of technical terms in the *Almagest* in Greek with the Arabic and Latin equivalents).

[15] The complex of these texts has been edited by Millàs 1931. A glossary of 63 transliterated Arabic terms compiled from 42 Latin treatises on the astrolabe, both translated from Arabic and afterwards written by Latin authors, is in Kunitzsch 1983.

[16] Cf. Kunitzsch 1977, p. 31 (no. 9) and p. 40.

[17] Cf. Kunitzsch 1977, p. 12 (no. 7), p. 32 (no. 32) and pp. 49f.

[18] Cf. Kunitzsch 1983, pp. 546-549 (no. 43a).

[19] Cf. Kunitzsch 1983, pp. 542f. (no. 36).

[20] Cf. Kunitzsch 1983, pp. 549-553 (no. 43b, 44).

[21] Cf. Kunitzsch 1983, pp. 481f. (under "FC").

of only Latin terms is in Chapter v of a treatise on the sphere, perhaps by Andaló di Negro [22]. Still another glossary has been edited by Pedersen 1973 (81 terms).

A field of its own is the nomenclature of the constellations and the stars. This was dominated by the nomenclature laid down in the star catalogue of Ptolemy's *Almagest*. Through the Arabic translations in Arabic-Islamic astronomy and through Gerard of Cremona's Latin translation from Arabic in the West this nomenclature remained prevalent through many centuries – in the West until astronomy here took a new development with the use of ever more refined technical equipment. At least, the majority of transliterated Arabic star names introduced in the Middle Ages continues to be used into our time [23]. A star name like *Altair*, or in German *Atair* (for the star alpha Aquilae), is used until now in the spelling first formed near the end of the tenth century in the milieu of the *Sententie astrolabii*.

That much can be said on the subject today. It will need the edition of many more texts both Arabic and Latin and their thorough study to arrive at a comprehensive survey of the medieval Latin terminology in astronomy and astrology and to decide what of it was surviving older Roman terminology and what was newly formed under Arabic influence.

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Munich

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[23] Cf. KUNITZSCH 1959.

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